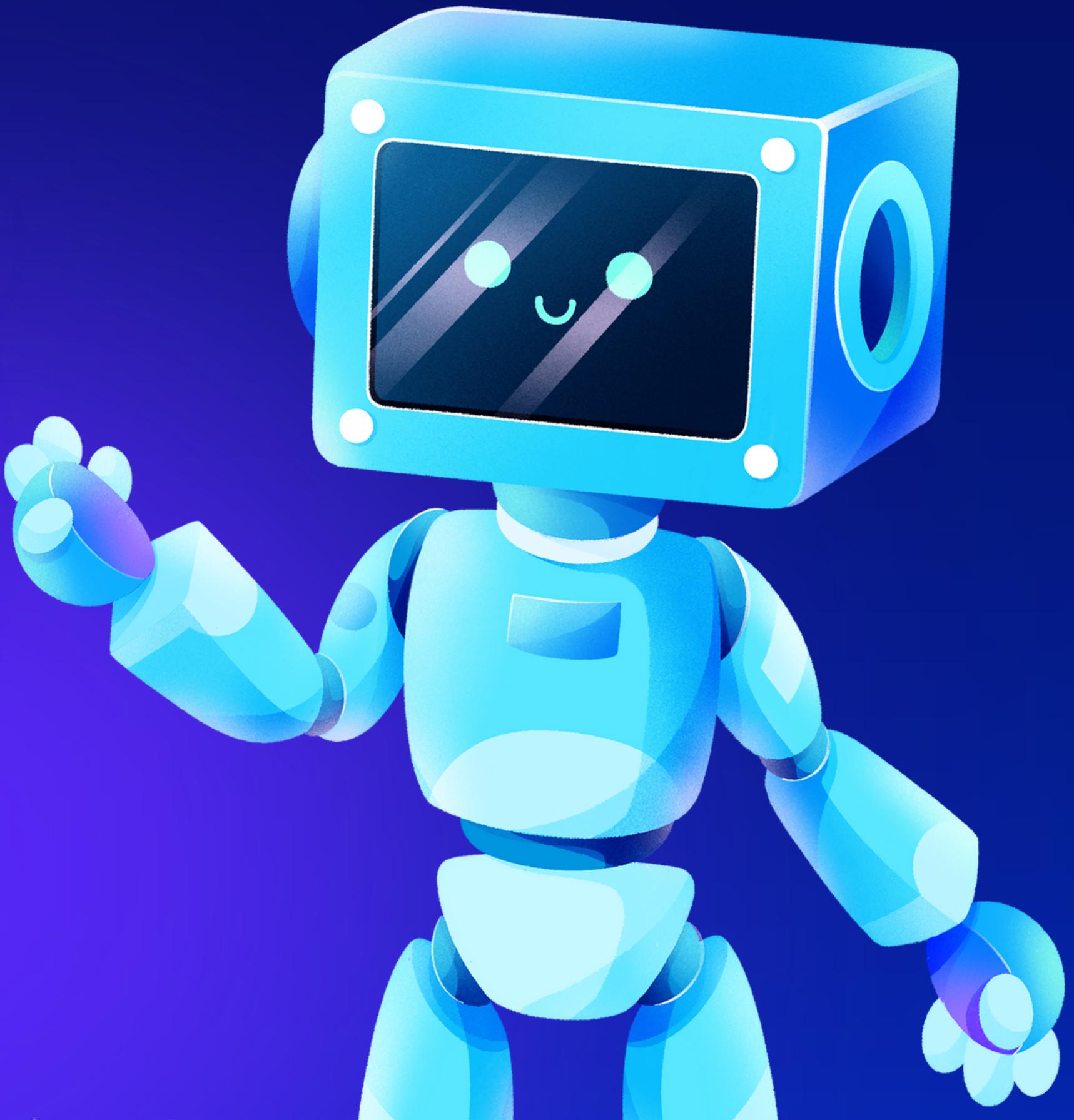




ARTIFICIAL INTELLIGENCE TETRA

By Dharmadhaashan P



PROBLEM STATEMENT

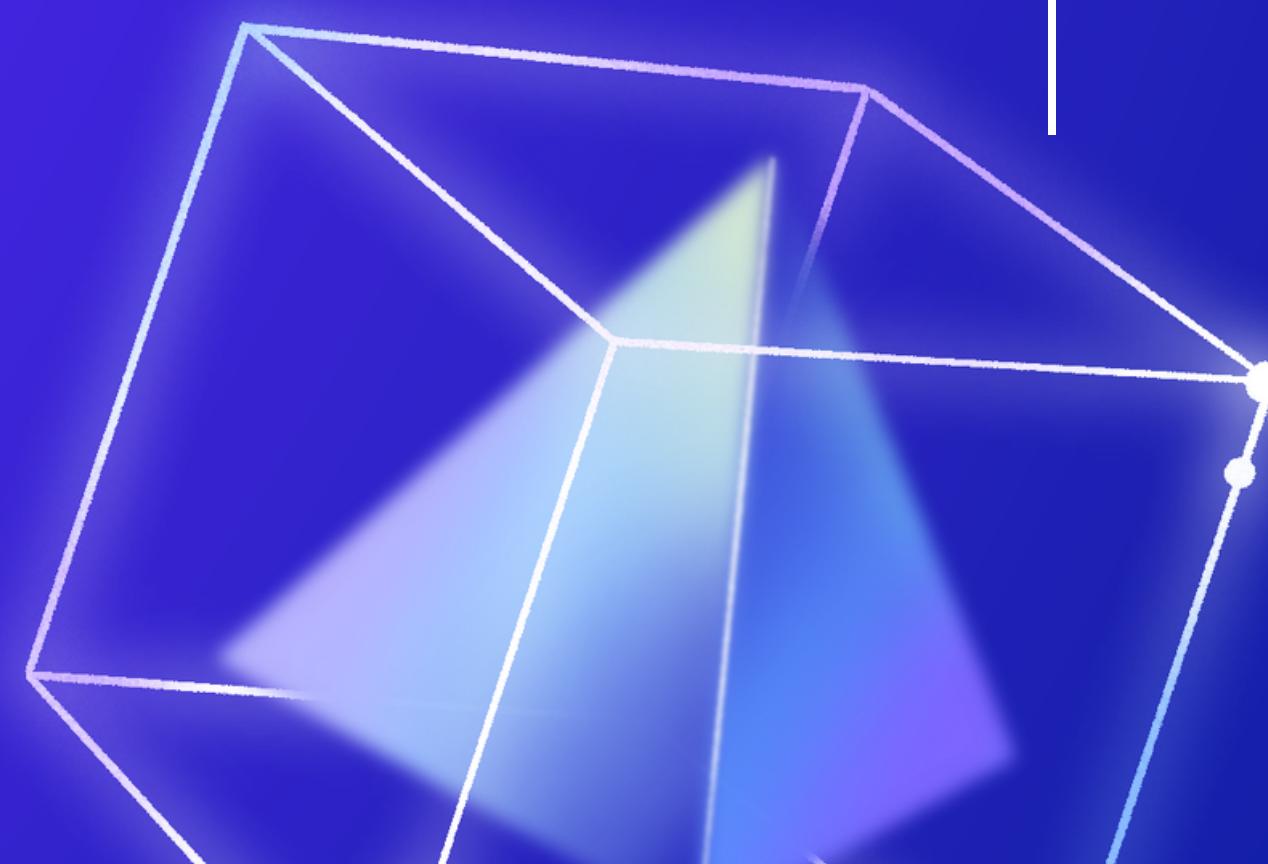
Design an AI/ML-powered traffic management system that can analyse realtime data from various sources, such as traffic cameras, sensors, and GPS data, to predict and mitigate traffic congestion. This solution should dynamically optimise traffic signals, ultimately reducing travel times, fuel consumption, and emissions.



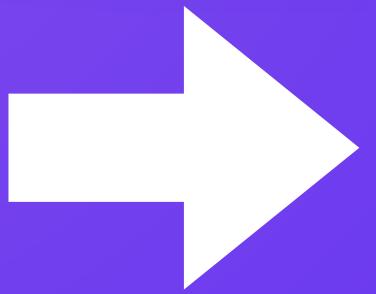


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- The reason why we choose this statement
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THE REASON WHY WE CHOOSE THIS TOPIC



Stress, Anxiety, Pollution: How Traffic Jam Affects Your Health!

How many people are dying in ambulance due to traffic?

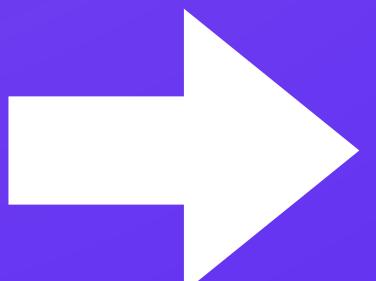


Every day in India, 24,012 patients die due to delay in getting medical help as ambulances are delayed due to traffic, and they are medically ill-equipped to help the critical patients.

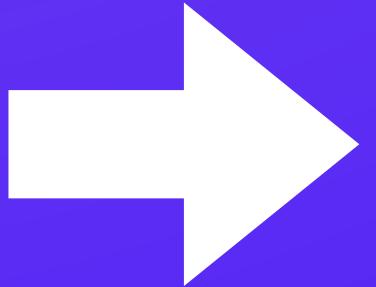


RADHEE Disaster And Education Foundation
<https://radhee.com> › advocacy › morth-road-safety

MORTH – Road Safety 



Unfortunately about 30% of deaths are caused due to delayed ambulance. In today's scenario the number of accidents per day is increasing exponentially and so is the number of deaths caused by it.



OUR SOLUTION



Vision AI

Vision AI facilitates smooth traffic flow by counting vehicles on the road, dynamically adjusting signal timings for each lane. This adaptive approach optimizes traffic movement, reducing congestion and enhancing overall efficiency.

Sound AI

Utilizing sound AI, we can detect emergency vehicles in specific lanes and prioritize their passage by clearing those lanes. This targeted approach optimizes traffic flow and ensures swift emergency response.

IOT

Employing IoT sensors to monitor pollution levels enables rerouting of vehicles to alternative lanes for pollution mitigation.

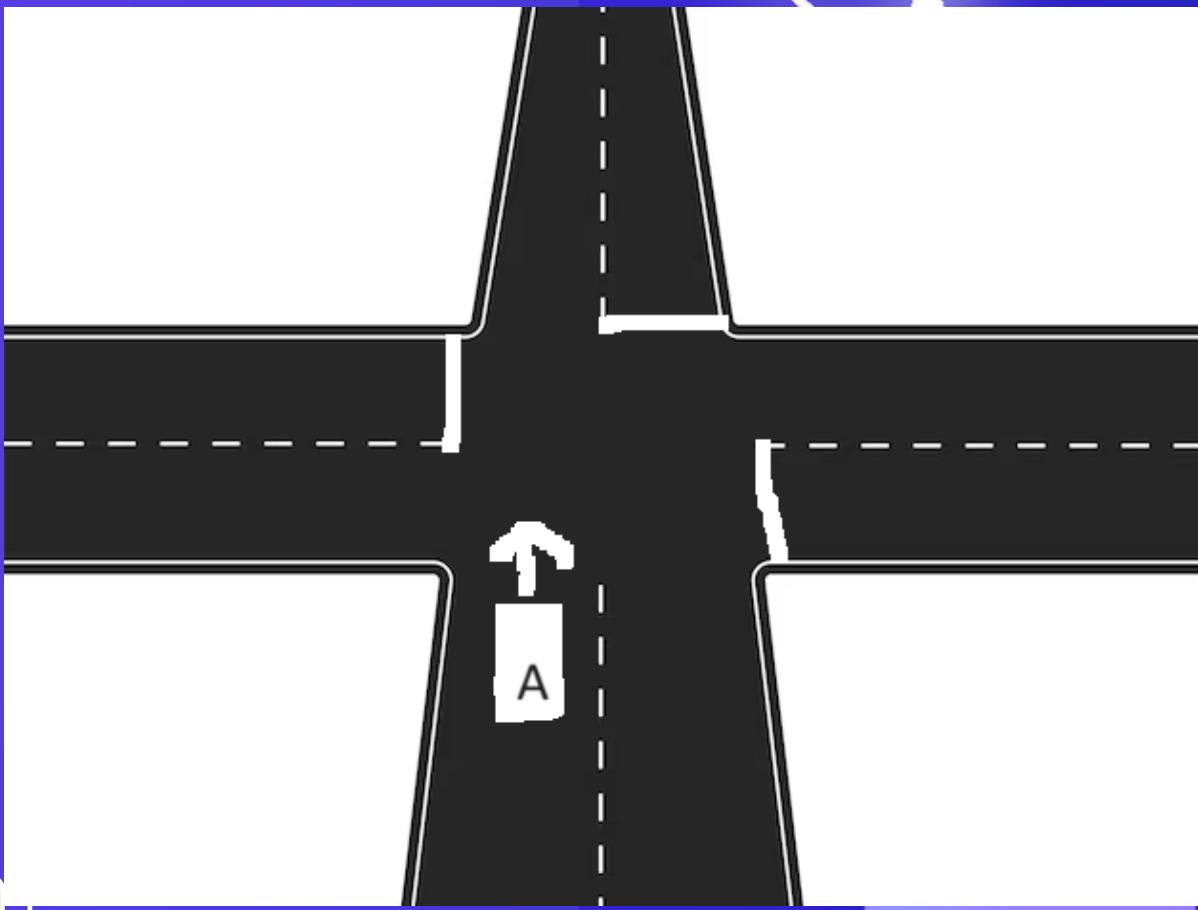
VISION AI

- Utilizing computer vision libraries like OpenCV and convenient tools like imutils, we enhance image processing tasks, particularly in analyzing lane-wise vehicle density. By leveraging these technologies, we optimize traffic flow by adjusting waiting times based on lane occupancy. This approach minimizes congestion, ensuring smoother traffic flow and reducing the likelihood of traffic jams.

SOUND AI

(02)

- Leveraging Python libraries such as Librosa for audio signal analysis, scikit-learn for machine learning model optimization, joblib for model serialization, and alive_progress for real-time reporting, the sound AI system detects emergency vehicles in lanes. It subsequently clears the lane for their passage while temporarily closing adjacent lanes until the emergency vehicle has passed.



IOT SENSORS

03

- Utilizing IoT sensors such as GPS, humidity, microdust, and carbon dioxide sensors, we monitor air quality and pollution levels in an area. Based on this data, we dynamically adjust traffic flow to avoid congestion in polluted areas, thus mitigating the risk of being stuck in polluted environments.

TECH STACK



VISION AI

- Python library
- Open CV
- imutils



SOUND AI

- Librosa(Librosa.display)
- Scikit-learn
(sklearn.model_selection,
Train-test split , SVM)
- Joblib
- Alive_progress



IOT SENSORS

- GPS Sensor
- Humidity Sensor
- Microdust Sensor
- Carbon dioxide
Sensor

ADVANTAGES OF AI-ML IN TRAFFIC FLOW

REAL-TIME ANALYSIS

AI systems process real-time data from traffic cameras, sensors, and GPS, enabling immediate responses to changing traffic conditions.

OPTIMIZED TRAFFIC SIGNAL CONTROL

AI optimizes traffic signals based on current conditions, reducing intersection wait times and improving traffic flow.

ADAPTIVE ROUTING

AI-powered systems can suggest alternative routes to drivers based on current traffic conditions, helping to distribute traffic more evenly and reduce congestion on main routes.

EMERGENCY VEHICLE RESPONSE

AI can automatically detect emergency vehicles and adjust traffic signals to prioritize their passage, improving emergency response times and potentially saving lives.

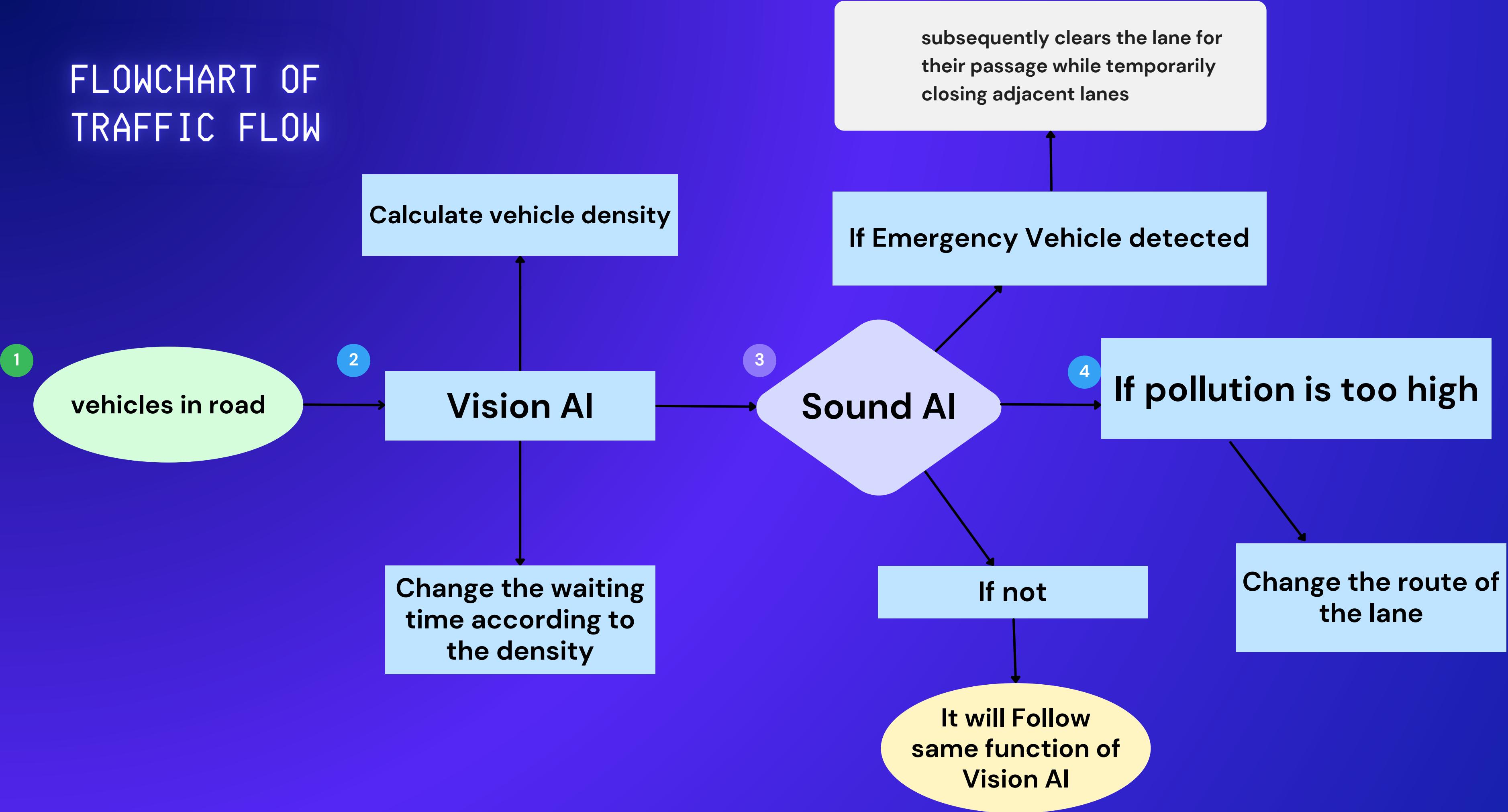
ENVIRONMENTAL IMPACT REDUCTION

By optimizing traffic flow and reducing congestion, AI systems can help minimize fuel consumption, emissions, and overall environmental impact associated with vehicle idling in traffic.

EFFICIENT RESOURCE ALLOCATION

AI can optimize the deployment of resources such as traffic officers and road maintenance crews based on real-time traffic conditions, ensuring that resources are allocated where they are most needed.

FLOWCHART OF TRAFFIC FLOW





CONCLUSION

Overall, integrating AI into traffic flow management can lead to smoother traffic operations, reduced travel times, improved safety, and a more sustainable and environmentally friendly transportation system.



THANK YOU!

